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PHYSIOLOGY AND HYGIENE IN THE SCHOOL-ROOM.

When we consider the many hours of a child's time that are passed in the school-room, under the guidance of a teacher; — the peculiar tasks allotted for the three consecutive hours of each half-day for ten half-days in a week; the school-room itself with its furnishings, in its best as well as in its worst estate; the nature of the beings upon which the teacher is to operate; the necessity which demands that a community of children assembled for purposes of instruction, be orderly, quiet, and attentive all the while; — the natural energy and activity of all their physical functions constantly rebelling against restraint; the expectation of those from whom the teacher derives his authority, that a certain amount of intellectual training be accomplished within a prescribed time; and that "public opinion" which fashions our system of education, — we are led to exclaim, in behalf of both teacher and taught, "Who is sufficient for these things?" And yet, at the appointed hour, thousands of little feet are wending their way to the school-houses that are scattered broadcast over the land, and the teacher's chair is always

graced with its occupant: — the former resorting thither in obedience to parental authority; the latter, from choice. And being a matter of choice, the teacher is presumed to possess the requisite qualifications for rightly discharging all the duties of the office. Let us see.

That it is the duty of the parent to care for the *health* of the child, is conceded by all. Now health is a term of vast import: it signifies the right development and harmonious action of all the physical, mental, and moral powers of man. "Health is order; and order is the law of good in undisturbed operation; it is the will of God as expressed in the perfect individual existence of other beings. As it respects a conscious and rational creature such as man, constituted in relation to the natural as well as to the spiritual world, health is the correct and pleasant performance of all the functions of life and mind as evinced in the body." The parent, in sending the child to school, transfers for the time much of his responsibility to the teacher. The teacher then stands "*in loco parentis.*"

A knowledge of medical science is by no means the exclusive privilege of the physician. The lawyer requires an acquaintance with medical jurisprudence; the pastor, in his counsels to the young, and consolations to the afflicted, needs to speak with authority concerning the laws of health and disease; but in these professions, their spheres of action are chiefly among the mature in life. To the school teacher belongs, not only the "delightful task to rear the tender thought," but also to aid in the development of the physical powers of childhood. It should be an ever-present thought in the teacher's mind, that he is dealing with the *young* subject; that growth and development characterize its whole being; nothing is yet complete, all is in the formative stage; and let him see to it, *that disease and deformity are neither engendered nor fostered in the school-room.* This suggests our topic: — *a knowledge of Physiology and Hygiene necessary in a school teacher.* To fortify our position, we must proceed to point out some of the sources of danger, and suggest the means of dcfence.

Should a child at school fall in a fainting fit, or be brought in from the play-ground severely injured, the teacher would not wait for orders, — the natural promptings of humanity would decide his duty to the sufferer. These startling occurrences, however, are comparatively rare, while not an hour of school time passes without demanding his vigilance, so insidiously and constantly is disease assailing the young constitution. Take, for instance, the subject of

Ventilation.

All agree that a pure atmosphere is essential to health. Now, what is this atmosphere? It is a compound of two gases, — *oxygen* and *nitrogen*, — in the proportion of one part of the former to four parts of the latter. Although four-fifths of the atmosphere consist of nitrogen, we do not withdraw any of it by breathing. It is the oxygen alone that acts chemically on the blood in respiration. *All living bodies must breathe oxygen, or die;* and all animal functions are maintained by the incessant play of affinities between the atmosphere and the organs.

How does the atmosphere of a school-room become vitiated? The body lives by converting dead organic matter into its own substance. This matter is removed from the influence of life as rapidly as it is brought under it. The removal is effected by the union of oxygen with the matter. The oxygen is received into the lungs in breathing; therefore *by every breath we so far vitiate the air around us.* At each breath we exhale eight or nine per cent. of carbonic-acid gas: — the air is unfit for respiration if it contain more than three and a half per cent. of this gas. It is a well-known fact that to inhale the gas arising from burning charcoal in a close room, is often fatal. Charcoal is carbon, which, in the act of combustion, unites with the oxygen of the air, forming carbonic-acid gas. Being heavier than common air, it falls to the floor, and, if generated in sufficient quantity, fills up the room, displacing the air above it, as does water poured into a vessel.

That we are constantly sending forth carbonic-acid gas from the lungs, may be demonstrated by a very simple experiment.

Inhale atmospheric air through the nostrils, and exhale by the mouth through a tube into a tumbler of limpid lime-water, which will soon become turbid like milk and water. Set it by for awhile, and when the water is again clear, a white precipitate will be observed at the bottom of the tumbler. Decant the water, and evaporate the sediment to dryness; the white powder is carbonate of lime, which may be tested by sulphuric acid.

Besides the carbonic-acid gas and water emitted from the lungs, the *skin* also excretes oily matter, and salts of ammonia, soda, potassa, with acetic acid, carbonic acid, and water. Thus by the act of breathing and by emanations from the surface of the body, we are constantly vitiating the air around us; and in proportion to the vitiation of the atmosphere by the breath and exhalations from the skin, it becomes capable of receiving and transmitting the seeds of disease. It should be remembered in connection with this topic, that an ordinary lamp consumes as much oxygen while burning, as a man in health while breathing; and that, if there is a stove in the room to warm it, the fuel requires its share of oxygen for combustion, all of which must be drawn from the air of the room. Hence, we infer that the *supply of fresh air must equal the consumption*, or mischief will ensue.

The *ventilation* of a school-room should be so conducted as to secure a full supply of *fresh*, *dry*, and *moderately warm* air; always remembering that the chief bad airs are the heavy carbonic acid gas, and the light hydrogen gas; and, therefore, to allow of their escape, there should be an outlet near the floor, and another near the ceiling, in accordance with Emerson's mode of ventilating buildings.

Rooms that are not furnished with suitable warming and ventilating apparatus, must be ventilated nevertheless, and that by the best means available, or evil cŏnsequences are sure to follow to those who resort thither. Let there be two, or even three ten-minute recesses in each half day, when the doors and windows may be thrown open, and the children sent out to exercise and breathe in the free air.

In the management of windows for purposes of ventilation,

many teachers evince a sad want of good judgment and discretion, forgetting that by opening a *wide* space at the top of a window, it allows two currents of air to pass, — an upper warm current flowing out, and a lower cold one rushing in and pouring down, like a water-fall, upon the devoted heads of the little victims who may be seated near. A space of *one inch* at the top of each window, and a like space at the bottom, will do the work much more effectually and safely. And in the matter of regulating the *temperature* of the room, the teacher's *feelings* should not be used for the thermometer, but it should be determined by a good Fahrenheit hung four feet from the floor, and remote from the source of heat. If 64° feels cold to the teacher, it must be owing to some morbid condition of the system. Never allow the wearing of overcoats, shawls, capes, tippets, and the like, in the school-room, when the thermometer indicates the right temperature. The reason is obvious.

Causes of Deformity.

Any remarkable deviation from the characteristic symmetry of the human form constitutes deformity, and is chiefly seated in the bones. The *bones* serve as the frame-work for the other parts of the body, surrounding and protecting the vital organs; and, in connection with the muscles, are the agents of locomotion. Bone is composed of two different substances, — *gelatine*, or animal matter, and *lime*, or earthy matter. The animal part predominates in early life; the two are about equal in middle life; and in old age there is more lime than gelatine, hence their liability to be broken. The bones increase in size and strength by use, and become weak by disuse. In infancy and childhood they are comparatively soft, more liable to bend than to break; they therefore require much more care for their shape and growth than those of mature age. They are not fitted for labor and severe exercise; neither will they bear long-continued exertions or positions with impunity. "Just as the twig is bent, the tree inclines," is as true of the animal as of the plant; hence, in sitting, the child should either find rest for the entire length

of the thigh bone, from hip to knee, upon the bench or chair, or the lower portion should be supported from the knees and legs by the feet resting easily on the floor. In order to secure this position without restraint, the seats for children at school should be of such height as to keep the thigh bone in a horizontal position. The seat being right, the writing-table or desk should be so adjusted as to allow the fore-arms to rest easily upon it without elevating the shoulders, or bending the chest. If the seat and desk are adapted to the occupant, the sitting postures of the child can be more easily controlled by the teacher. We are aware that there is an attempt at graduating the height of desks and chairs according to the ages of the children in the several grades of schools. This is good as far as it goes; but the *stature* of children not being uniform with the age, and children not being classified strictly according to either, but rather by their mental qualifications, it becomes necessary to provide the individual child with such a chair and desk as suits him exactly, no matter what his rank may be in the scale of intellectual acquirements.

The *muscles*, which are the organs of motion in the body, must also be used, that their size and strength may be adequate to the demand made upon them. Rest must follow exercise, at or before the sense of fatigue, for long-continued tension of a muscle exhausts its power, enfeebles its action, and eventually destroys its contractility. This physiological fact will serve to show that those who impose constrained postures upon children, as means of punishment, such as long standing on a small base, on one or both feet; holding an object with the extended arm, or with the teeth, or upon the head; pinioning the limbs; or any mode whereby painful fatigue is induced, are, to say the least, guilty of wanton barbarity or unpardonable ignorance, and are out of place in the school-room.

Besides guarding against deformity in the limbs, the teacher should be upon the alert to ward off a much more serious evil in another quarter, — *the spine and chest.* The spine, or back-bone, consists of twenty-four separate bones placed one on the other, with a substance resembling India-rubber be-

tween them. A canal extends through its entire length, containing the spinal marrow, which sends off in pairs the nerves of voluntary motion, and many of those nerves that give power to the lungs, the heart, and the stomach. These bones, in early life, are in part composed of an elastic substance, and are always of a porous texture. The peculiar organization of the spinal column renders it capable of much motion, and very liable to deformity during the first twenty years of life. Its natural form is straight laterally, but curved backward in the chest and forward in the loins. The ribs and breast-bone form the frame of the chest, a cavity which contains the heart and lungs. It is so contrived by the all-wise Architect, as to afford the requisite space for these vital organs freely to perform their functions.

When we consider the degree and nature of the service which this single long column, the spine, is called upon to perform, — that it supports the entire weight of the head, neck, and arms, and the principal part of the trunk; and at the same time gives lodgment to the spinal marrow, we may readily perceive that any causes, which affect the health and produce general debility, must operate powerfully on this part of the system. The spine, when weakened, gradually yields under its load, loses its natural curves, and acquires others; and these curves will be proportioned, in their degree and permanence, to the producing causes.

A distortion of the spine is necessarily accompanied by *a distortion of the trunk* of the body. That part of the column which supports the right arm is commonly the first to become affected, because of the elevation and action of the right arm in writing and drawing. It causes a bending towards the right shoulder, thus raising it higher than the left. This curvature to the right, in the upper portion of the spine, is accompanied, as a consequence, by a curvature to the left in the lower part, causing a projection of the left hip. Nor does the mischief stop here. As the ribs are connected with, and supported by, the spine, any movement of the latter must carry the former with it; hence, the ribs of the right side are pushed forward, causing a deformity in the forepart of the

chest, and those of the left side are forced inwards or backwards. Thus this cavity, which was formed for the lodgment of the heart and lungs, and nicely adapted in its shape and dimensions to their necessities, is distorted and contracted; and, as a consequence of this encroachment upon the healthy action of these important organs, we need only mention — shortness of breath, palpitation of the heart, and the usual phenomena of dyspepsia, to indicate the duty of the teacher in this particular. He should be watchful of the postures which his pupils assume while seated at their studies, their attitudes when standing, and the ordinary carriage of the body in walking. He should repeatedly caution them to avoid all bad positions, while at work, such as bending the head, neck and chest forward in a stooping posture; sliding off the front edge of the chair, so as to rest upon the lower part of the back, thus bending the whole spinal column into a semicircle. The delicate and feeble ones of the flock should be the objects of special care.

Every occupation requiring the joint use of the hands and eyes, should be so pursued as to prevent continued stooping. Frequent change of position is demanded in the school-room, and to this end, the exercises should be so timed and arranged as to call the children from their seats as often as every half hour, and in the primary school, every fifteen or twenty minutes. The practice of a system of calisthenics twice in the course of the school session, in addition to the regular out-door recess, will do a vast deal towards preventing the evils complained of, and driving off the drowsiness and restlessness which would otherwise ensue.

We would here interpose a word in behalf of the little sufferers in our *primary schools;* and, in this particular, we hold the teachers, in a large degree, blameless. We allude to the want of *desks for the children.* The reason assigned for this deficiency is, that children between four and nine years of age do not write. We see no objection to their being taught the use of the pencil at this early age; we know they can be, and we think they ought to be; but *we claim the introduction of desks in the primary school as a* SANITARY *measure.*

The class of evils to which we have alluded, *begins* in the primary school, when the bony frame is exceedingly pliable. There the child is subjected to far greater discomforts than in the higher school, being compelled to sit most of the time upon a bench or chair, without any means for resting its book except upon its lap, which "tired nature" is sure to do when the eye of the rigid disciplinarian, who prides herself on the uniform array of little statues, happens to be averted. In concluding these remarks, we would reiterate our injunction, to primary school teachers no less than to others, — *see to it, that disease and deformity are neither engendered nor fostered in the school-room.* Keep your little troop moving. We abhor remarkably still primary schools, because they are unnatural. You, who are able to bear it, would think it harsh treatment, were you compelled to take the places of your pupils.

In what we have said, we do not feel that we have exhausted the subject. We have only seized upon some of its salient points, sufficient to show the teacher's responsibility in the matter. To meet this responsibility efficiently, implies a ready knowledge of Anatomy, Physiology, and Pathology, with the principles of Natural Philosophy and Chemistry, and a determination to carry it out. C. S. C.

THE COMET.

LONE traveller through the fields of air,
What may thy presence here portend?
Art come to greet the planets fair,
As friend greets friend?

Whate'er thy purpose, thou dost teach
Some lessons to the humble soul:
Though far and dim thy pathway reach,
Yet still thy goal

Tends to the fountain of that light
From whence thy golden beams are won;
So should we turn, from Earth's dark night,
To God, our Sun. *Mrs. Hale.*

COUNSEL TO A TEACHER IN REGARD TO STUDY.

[We here give a translation of another chapter, somewhat abridged, from the excellent Guide for German Teachers by Diesterweg. The book, though adapted in its details only to the wants of German teachers, yet contains much in its more general parts of value and interest to all teachers. — W. P. A.]

1. Confine yourself to first-class writers on any subject which you wish to study, or which you wish to prepare yourself to teach. Do not seek information first out of encyclopædias or periodicals, but study some work of the very highest character, by some author who is among the leading minds devoted to the subject. The reading of periodicals is good and useful —when they are fresh and vigorous — for the sake of increasing our interest, and of keeping up with the discoveries of the day, which, though they may not always be of great importance, have yet a significance for us, because they are the discoveries of the day, and also for the sake of ascertaining what is deserving of further study. But the reading of many transient writings swallows up a vast deal of time, and inevitably weakens the mind. If we read nothing else, all true progress is at an end. Solid treatises should be our daily bread; periodicals, and the like, only holiday reading; but we must not keep holiday all the time.

2. Study only one subject at a time. As in teaching it is a very important rule, though, alas! not sufficiently attended to — and certainly it is difficult to put it in practice — to arrange the subjects of instruction so that they shall follow one another, and not come all together — so, also, apply the rule in self-instruction. Too great variety and mixture of mental or of bodily food, is injurious and unwholesome. The body thrives when we feed it on a sufficiency of simple nourishment; the mind is strengthened when we direct all its energies on one chief subject at one time. Whatever else is pursued simultaneously with it should be a lighter by-work, for the sake of recreating the mind by change.

3. In first studying a book seek to understand thoroughly every separate part, every single sentence, and every single idea; and only proceed further when you have succeeded in this, or when you have sought in vain for the right meaning; in proceeding further, turn your attention particularly to the parts that have remained obscure. When you have studied sufficiently the separate parts, then take a thorough and comprehensive survey of the whole.

This course of proceeding, from the parts to the whole, I consider as, in general, the best. The best writers pursue it in their works, and it corresponds to the course of development of the human mind to proceed from the near and the particular to the remote, the abstract, and the general. In scientific statements, properly so called, the opposite course is, indeed, pursued, by beginning with the general principles of the system; but such treatises are not intended for the class of readers for whom we write. In reading such a work, aim, first, at a comprehension of the general plan. It is well to examine thoroughly the table of contents in order to understand the arrangement of the parts, the division of the material, and the connection of the whole. This survey facilitates greatly the after examination of the work, and gives us a useful insight into the logical power of the author.

I ought to observe that though, as a rule, one ought not to proceed in the study of a book till he has mastered everything behind him, yet there are limits to this slow and analyzing method, beyond which it should not be carried. One may dwell on individual points with too anxious and pedantic scrupulosity. Much depends, in this respect, on the nature of the subject and on the mode in which it is treated — to say nothing of the individual peculiarities of the reader. The closer the connection of the different parts, the more logical the arrangement and dependence of what follows upon what precedes, the more essential, of course, is the comprehension of one part to that of the other, and the more one must dwell on particulars, as, for instance, in mathematics. In other subjects the dependence of one part upon the other is not so great, and the treatment may be different. But in no case

allow yourself to be hindered from proceeding by difficulties which you cannot overcome, for often the previous difficulties will be fully cleared up by the light shed on them by what follows, as frequently the mid-day sun disperses all the clouds of the morning. Not every subject allows, and not to every writer is it given to remove at once all possible difficulties from the path of every reader. Still, it must remain the rule, that we should endeavor to understand every word, and not only get a general comprehension of its meaning, but understand it in the precise meaning the context requires. "He who discriminates well, teaches well," is an old rule. Whoever would learn to teach, must learn how to discern nice differences. The clear, logical head, therefore, hates all writings which involve their subjects in clouds and darkness, and which substitute a crowd of words and phrases for the clearness from which alone the truth can come. Of course, there are different kinds of clearness. Every subject does not allow of mathematical precision. But whoever finds pleasure in the dark, indefinite, unmeaning, and cloudy forms of expression which are reckoned now-a-days, by many, as signs of profundity, and is willing to take into his memory and communicate to others conclusions whose premises he does not understand, is forever spoiled for being a teacher of youth. It is only in the warm sunlight of clear truth that the youthful mind will grow. * * * * * * * * * * * * * * * True culture consists, not in a conglomerate of miscellaneous knowledge, but in complete clearness in that department which we have chosen for our self-development. I therefore counsel you constantly to inquire what parts of that most need your examination. Socrates placed himself quite on an equality with the Sophists, in so far that he confessed he knew nothing; but he placed himself above them, in that he *knew* that he knew nothing, a piece of knowledge the Sophists did not possess, inasmuch as they believed they knew what they really were ignorant of. Follow his example, and return often and repeatedly to the dark places of your consciousness. Later insight, perhaps gained in some quite different department, will often suddenly throw

light on those dark places. Whoever has once enjoyed the pleasure which this experience gives will never doubt that honest striving will always lead him, at last, to true clearness. Providence has given every man the power to attain to that degree of wisdom which will lead him to true life. It is the destiny of the human race and of every individual in it, to have the light of truth to enlighten them. Before it the dream-clouds of deception will vanish. Let "Forward!" be your motto your life through.

4. Return frequently and again and again to works of the most importance. It is often impossible to master, *at one time*, the contents of an important work, to change it into our own flesh and blood so that we can no longer discriminate between what was originally foreign and what was originally our own. Time often fails, and often the requisite condition of mind. For this reason, we find quite new matter in the same work, at different times, and a work which is really full of matter becomes an inexhaustible mine. Thus it happened that that scholar who began, in reading Homer, to mark the passages that pleased him, found, after repeated readings, that he had marked the whole poem. Schwartz recommends the reading of Kant's Anthropology, one of the most instructive and interesting works in our language, once every year.* Thus you will make the pleasant discovery that at the second or third reading you will get ideas which you entirely missed on the first — a sure proof that your mind has been making progress in the meantime. For though one, for a long time, may not occupy himself with a particular subject, yet his capacity for

*[As the end of study is not merely to compass the knowledge of facts, but in and from that knowledge to lay up materials for speculation, so it is not the quantity read, but the degree of reading which affords a profitable exercise to the student. Thus it is far more improving to read one (good) book ten times than to read ten (good) books once; and "*non multa sed multum*," little, perhaps, but accurate, has, from ancient times, obtained the authority of an axiom in education from all who had any title to express an opinion on the subject. "He who lives everywhere is at home nowhere;" the friend of all is the friend of none, nor is there, intellectually, a more contemptible character than a Margites, "*in omnibus aliquid, in toto nihil.*" And as they are not the healthiest who eat the most, but who digest the best; so a university [or a school] as an intellectual gymnasium, should consider that its "mental dietetic" is tonic, not repletory — that its function is not to surfeit, but to stimulate curiosity — not to pour in a maximum of information, but, through its information (be it much or little) to draw forth a maximum of thought. He, therefore, who reads to remember, does well; to understand, does better; but to judge, does best.—*Sir William Hamilton.*] TR.

comprehending it may nevertheless increase. The mind is a unity, and every real increase of strength in any one direction, is an increase of strength for the whole mind. This is especially true of any increase of power in the higher faculties, the understanding, the judgment, the reason. Every one who occupies himself with literature has his favorite writers, with whom he specially sympathizes; and what a pleasure it is at each new return to the perusal of them, to find that we understand them better, and discover in them new treasures unobserved before.

Have courage, then, we say to young people and to teachers — have courage, and trust yourselves that you can discover and recognize the truth. Courage is required as much for earnest study and earnest thought as for earnest action.* Dare everywhere to attempt the best of writings on all subjects. Not only singing and praying belong to religion; thinking is a religious act; "to nourish the soul is religion."

5. It is a very useful habit to read such books as do not belong to the class with which you are constantly occupied, pen in hand, and to make notes and extracts in an extract, or common-place book.

This does not apply to books which belong to your profession, — for those you must always have by you, — but to those whose contents do not tempt you to make them lasting and intimate friends; only partially therefore to our classic writers, — for with the perusal of those every cultivated man is supposed to refresh his mind his life long, — but to such as we borrow from our friends, and only read once or twice or thrice. It is a good plan to embody in such an extract-book such of your own thoughts as you consider worthy of preservation, unless you prefer to keep a separate book for that purpose, and arrange it by titles and subjects. As to the keeping of journals, — unless it be for an extraordinary occasion, as a journey or the like, I cannot recommend it. The habit of living, active, healthful occupation is opposed to it, for it

* "My prayer (in the Church of the Holy Sepulchre) was heartfelt and earnest; I prayed for truth and courage at the grave of Him who brought the most truth into the world, and who, for the truth of which God had made him the organ, made the most courageous of sacrifices." — *Lamartine's Travels in the East.*

leads too readily to an empty, sentimental, sickly self-inspection, and a conceited self-description, to the injury of all healthy and manly action. But the writing out of significant, interesting, even paradoxical thoughts, such as can be used afterwards as subjects of examination or reflection, is very useful both to keep yourself from onesidedness, and to guard against a thoughtless and cursory habit of reading. The most distinguished men of our nation have employed it. For do not believe that any genius is great enough to draw all its materials from itself. Every aspiring thinker, however great his powers, uses the riches of the past to raise himself above his time.

From time to time, on Sundays and other times of quiet leisure and self-collection, examine the treasures which you have collected in your extract-book, to bring them again before your thoughts and repeat the original impression. If you thus, from month to month and from year to year, consider and reconsider the material thus constantly collecting, your mind will ripen to greater and greater completeness. And what a pleasure to discover, after a longer or shorter time, that you have gradually attained to a ripeness of insight from which, as from a mountain-top, you can look down upon former difficulties as upon insignificant hills. Thus you gradually climb the elevations of humanity, approach the limits of the powers which God has given you to exercise, and ripen for entrance into that sphere where light eternal shines. * * * * * * * *

7. Make your profession the central point of your reading. Whenever unity, harmony, coherency, and a (relative) degree of completeness and progressive development are aimed at, then some central point might be chosen towards which all study and effort must, as it were, gravitate. This centre of gravity should be the teacher's own profession, and in furthering it he should find the satisfaction of his life. To it, therefore, he should refer in all his doings, and it should be the guiding aim of his self-culture and self-development. Harmony will thus arise between the occupations of his leisure and the hours spent in his calling.

The contrary course may easily be pursued: the teacher may spend the hours of his leisure in occupations which have no connection with his profession; he may apply himself to studies which will contribute nothing to his skill as a teacher, but he loses in this way a valuable means of increasing his skill. I do not mean to say that he should never read a book for mere amusement; but the solid reading in which he engages should have another character, and should have reference, as I have said, to his profession.

INSTRUCTION ON FAMILIAR FACTS IN PHYSICAL SCIENCE.

[THE following paragraphs from Mr. Stow's account of the Scottish Training System, will serve to show the strictly practical character of the instruction given in the training schools, and the care taken that, while the aim of their style of education is quite high in an intellectual point of view, there is yet no neglect of common things, or of the requisite preparation for a useful life.—R.]

WHY TEACH SCIENCE to children in an elementary school? What can they understand of latent heat, the radii of a circle, centrifugal and centripetal forces, gravitation, electric fluid, and innumerable other more complex terms? (say some objectors.) Now we have to say, that all such terms can be simplified, and when reduced to simpler terms, they can be understood by children a few years old. Having these outlines clearly analyzed by *familiar illustrations*, so as to communicate the idea in the first instance, they can then be made to understand the most complex terms, expressive of the most complex movements and conditions. For example, the motion of a child round a circular swinging-pole in the play-ground, may illustrate, in some measure, how the moon keeps in its orbit round the earth, and the latter, or any other planet, round the sun; in other words, what is meant by the centrif-

ugal and centripetal forces. The proper course of education in science has too generally been reversed; and the reason why so many adults stop short in their progress, and cannot educate themselves, (for education ought only to close with life,) is that they have committed to memory technical terms, which *not having been pictured out* and illustrated, are not understood; and also the minute points of science have been given before the great outlines were drawn.

The philosophical terms which a public lecturer finds it necessary to use, are seldom thoroughly understood by the audience; they have not been explained, far less pictured out to the mind's eye. The audience do not therefore *see* the bearing of each point of the premises laid down, or the conclusions at which the lecturer arrives, and at the close are found oftentimes to have acquired no distinct impression of the actual lesson, which otherwise might have been received. They may applaud the lecturer as being a very *clever man*. "It was an excellent lecture!" "What beautiful experiments he performed!" "How remarkably bright he made the gas to burn, and what an explosion it produced!" But the lecture itself has not been comprehended. This is the every-day experience of the young and the old in attending public lectures on science. It would have been otherwise after a course of early school-training.

The lessons during the first stage, or the outlines, at whatever age the child commences his course, ought to be exceedingly simple, and should comprehend a number of the more obvious things in nature and in art, which every child ought to know in their great outlines, before he is perplexed with minute points, or the use of technical terms; a knowledge of which he gradually acquires as he advances from stage to stage.

As a child, I wish to know what wheaten bread and corn bread are; the distinction in quality, and how they are made; how butter and cheese are made; what salt is; how wine is made, and of what composed; what brown and loaf sugars are; the nature of tea and coffee, with the places where they are produced, and how they are brought to the condition in

which they are found when used at home at the fireside; the distinction between wool, cotton, flax, and silk, both how they are produced, and why more or less warm.

The child ought to be made acquainted with articles of furniture. These are continually presented to his notice, and they afford the means of exercising his powers of observation, and training him to think. Their nature and relative qualities ought to be made familiar to him.

The natural history of the more common animals, domestic and foreign, is also an object of interest and a means of enlargement to the young mind, particularly when united with a short history, not merely of the habits of the animals themselves, but of the countries and inhabitants in and among which Providence has placed them, and the peculiar adaptation of each to its own particular circumstances. As a child, I wish to know why the swallow is not seen during winter; why the hen has open feet, and the duck webbed; with other more minute points of the formation of animals; why the butterfly is seen in the summer only; from what origin it has sprung. What are all these? the child naturally inquires, — and whence do the wings of the latter derive their pearly whiteness? Of what use rats and mice are, seeing they are so troublesome in our dwellings, and why and when they may be killed, without our being chargeable with cruelty; how the foot of the reindeer is suited to the frozen regions of Lapland, that of the horse to our own, and the camel's to the sandy deserts of Arabia. From each and all of these training-lessons the children may learn something of the power, and wisdom, and goodness of God to all His creatures; and such lessons should uniformly be drawn from the children by every trainer, during the daily oral training-lessons.

The child sees himself surrounded on every side by men of trade and handicraft, and he wishes and ought to know not merely the qualities of things, and the materials in use, but how they are moulded, or joined, or mixed, or decomposed, so as to render them serviceable. He sees the smith form a nail or a horse-shoe; why does he heat the iron in a furnace before laying it on an anvil and striking it with a hammer?

The uses of the pulley, the screw, and the lever, ought to be pictured out to him by analogy and familiar illustrations. The child sees paper; why not woven as a piece of cloth, and why more or less impervious to moisture?

The child breathes air, drinks water, sees steam, hail, and snow. What are all these? the child naturally inquires; and why is the last *white*, and when melted turns into water? What are thunder and lightning, and are they of any use? The sun to him appears always round, and so the moon, — why so? The principal parts of his own body, and those of other animals, with their relative functions, ought to be known; the qualities and names of the more common minerals, and the great outlines of botany, &c. Such oral training-lessons ought to be commenced in their outlines in the Initiatory school, and carried forward more minutely to the Juvenile and Senior Departments.

Much of the bewilderment felt by men of all degrees of acquirement, rests in the fact, that scientific terms have not been analyzed or pictured out by *familiar illustrations* as a first step in their early education. Complex subjects, and complex terms, which ought to have been the last, have generally been made the first stage; consequently blindness, to a considerable extent, continues; these first and natural steps not having been traced. The acquirement of these primary steps, therefore, is an ordeal to which every student who practically studies in the Glasgow Normal Seminary is subjected, before he can communicate what he knows to the children in the model or practising schools.

In the industrial department, there are many important points, with which the girls ought particularly to be made acquainted, and which may be carried into domestic and social life; such as, the scientific reasons why a room is better aired by opening the top of a window than the bottom, — how to sweep a floor without watering, and without raising the dust, — the effect of making tea with water just brought to the boiling point, and water which has boiled for some time, — how to make or mend a fire, so as to save fuel, and whether the top or bottom of the fire ought to be stirred, in rendering

it what is termed either a good or a lasting fire, — the philosophy of combustion, and whether smoke ought to exist at all, or to what extent, and how it may be cured or prevented, — the scientific and practical effect of toasting bread, and laying one slice above another, — and the effects, practically and scientifically, of fire on woollen, cotton, linen, and silken cloths. These, in addition to those previously mentioned, and a number of other practical matters, may be rendered highly useful to females in after life.

Children, of both sexes, should be exercised daily on some point of science or the arts. Whatever is done should be well done. Analyze one point clearly, rather than a dozen points imperfectly. Variety does not dissipate the mind or render knowledge superficial; it is only so when the mere surface is presented, without a proper analysis and *picturing out*. The child is fatigued and disgusted when kept too long on one subject, or course of subjects, whereas each power of the mind is strengthened by frequent and varied exercise. The natural process on entering a garden, for example, is first to look at every thing within its four corners; but the plan generally adopted by the lecturer is to spend, as it were, a week at the door-step analyzing the first few plants met with. Let the mind see the whole outline of each department it enters upon in the first instance, and then with interest and intelligence it will patiently investigate each step in its progress.

When objects are within our reach, we make use of them in conducting the lesson as a sort of text, or starting-point, but whether within reach or not, our principle is to picture out the whole lesson, and every point of the *subject matter* of which it is composed. Facts, of which the pupils prove themselves ignorant, are stated by the master, — the lesson is then drawn, and given at the time by the children themselves. Their ability to do so, is the test whether the subject has been properly pictured out or not, — for if so, they must understand what they mentally see, — keeping in view that we do not know a thing until we *see* it with our mental eye. For example, if separate lessons have been previously given upon

the properties of heat, and water, and steam, and air, and the condensing influence of cold, and the screw, and the pulley, and the inclined plane, and the lever, and the centrifugal force; and if all these and other forces be pictured out, as combined in one machine, the children will readily understand what a steam engine is, in their minds, and tell the trainer the effect of its power upon the shaft that may move spinning machinery, raise water, or propel a steam-vessel or railway train. This is a fundamental part of the Training System; and a knowledge of secular subjects, as we have already said, also enables the Bible-trainer more easily to elucidate many of the lessons of Scripture.

These oral gallery lessons are conducted daily on precisely the same mode with Bible-training lessons. Whilst the Bible-lessons are uniformly read from the Bible itself, the secular oral gallery training lessons are taken from such subjects as are given in a subsequent chapter. The Bible lesson ought to be the first in the morning, and the oral secular gallery lesson the first in the afternoon, although only one half hour should be occupied in conducting it.

There are very few good text-books on science and secular subjects, which can be read by the children before and at the moment the daily secular lesson is given, both because they are generally too lengthy or incomplete, and because nine-tenths of the points to which our oral training lessons refer, are less abstract, and of more practical advantage, than the subjects to which these treatises refer, and must of course be given by the master. Oral secular training lessons, as a distinct branch, therefore, are conducted by the trainer *without a book*. This, however, does not prevent the master elucidating any point he chooses to fix upon during the ordinary reading lessons.

By some strangers we are complained of as being too simple, by others as being too lofty, in the subject matter of our lessons, and that the terms used while analyzing them are too simple, or, on the other hand, too complex; they would thus place us between two fires. Our desire, however, is that the pupils *see* every step of the progress of picturing out, what-

ever the subject may be. Our practical students at first uniformly complain of the difficulty of simplifying every subject; but, eventually, they become fully convinced, from experience, that *simplicity is the last and highest attainment of a trainer of youth.*

ON THE METHOD OF TEACHING HISTORY.

History is not only "an account of facts," or a narration of events in the order in which they happen, a dry register of wars, kings, and revolutions; it is also a continual development of the condition of man, a constant changing, the pulsation of life. It is a grand organization, an organic unfolding of life, proceeding from various centres in manifold rays, which influence each other, and produce in the end perfect harmony. It is a continuing revelation of God, a proof that a divine plan lies at the foundation of the universe. Without faith in a wise Providence as the moving spring of all motion, history becomes a comfortless chaos. Only the divine element in history makes the latter a light to the present, an oracle for the future, a teacher of wisdom and virtues, a parent of true patriotism. Such is history. It is, of course, not the business of scholars in our common schools to fathom its depths. But even a child may be led to see the doings of the Almighty in eventful periods, and the hand that upholds us day after day. In order to give good instruction in history, *much* and *little* is required of a teacher.

Much soul, much faith, much talent; and, on the other hand, but little material, carefully selected. Not every event that happens belongs to history. It has its nut and shell, a lasting interest and one that passes away, a principal idea which will remain, and minor influences which will disappear.

History is an important branch of instruction in our public schools. What lies nearer to man than what has happened to

his fellow-beings in times past? What can be more useful, and speak more impressively to the young, than the experiences and deeds of those before them? Good instruction in history has a *moral influence*. It offers noble, fresh, inviting examples of true liberty and virtue, which are reality, not fiction; possibilities for the young, not castles in the air. It sharpens the moral judgment about right and wrong, truth and falsehood, reality and appearance. What, for a time, seemed to be profitable, finally caused destruction; great apprehended evils proved in the end blessings.

It develops and cultivates the moral feeling. The hand of God executing the law of retribution may be seen on every page of history; startling instances of reward and punishment are brought before us, which cannot fail to stir the soul to its depths. It raises the general standard of the soul, and thus insures, in proportion, a wise use of the intellectual powers. All our outward deeds are but the results of the unseen working of our mental powers.

This is true for individuals as well as nations. To judge rightly of an act, makes it necessary to ascertain the moral standing-point of the actor, and the motives by which he was governed. And when a scholar is led to scrutinize carefully the doings of others, he will, by the hand of a faithful teacher, be led to examine his own motives, and thus find defects which he will try to mend. We live only as much as we act, and all our knowledge is but so far fruitful as we are influenced by it to moral action.

History, if taught rightly, will influence a scholar to deal with its truths, as the burning glass does with the rays of the sun. All knowledge and experience hitherto gathered, will be collected into one focus and be applied to the work to be done. Good instruction in history will have beneficial influence over the *intellectual powers*. The understanding is sharpened by seeing how important events originated in trifling causes; how the largest schemes and extensive preparations dwindled into nothing; how laws, manners, customs, and trades of one nation differ from those of another; how differently individuals were influenced in periods of abundance

or want, of war or peace, in moments of terror or unexpected success. Facts are presented, motives to be found, and the way is to be traced, how these motives were developed or influenced in different situations. The memory is strengthened by retaining historical events, their time and locality, their causes and effects, and their principal actors.

Imagination receives a much healthier, and more substantial food from the fields of history, than all romance can offer. Finally, the necessity of reciting history in his own words, and in his own manner, affords the scholar an excellent opportunity of learning to express his thoughts clearly.

What general rules of instruction have an important bearing upon teaching history?

1. Instruction in history should awaken and call into cheerful activity, the various mental powers of the scholar. The teacher must necessarily talk a great deal, but the principal exertion is to be made by the pupil.

In morals and science, one owns only so much as has been won by individual effort; no one can learn to be good for another. Therefore, the pupil should be led not to recite the words of his book or teacher, but to utter his ideas in his own language. This would give to the teacher ample opportunity for necessary repetition, explanation, and correction, and cause a reciprocal activity between the teacher and the scholar, which would show itself in the bright faces of all concerned. To the student and philosopher, history is worthy to be studied for its own sake; but in our public schools, it should mainly be one of the means for the general development of the pupils. Scholars should be benefited by the study of history as people are by putting money in a savings bank. The right and hope of using the treasure lies in the future, and is not always realized, but the good habit of becoming prudent, cautious, and saving is acquired in the present and with certainty. The study of history makes it necessary to commit many things to memory, yet it is well to know that names and numbers are only the nails or hooks on which the material is hung. Time, persons, and facts are to be introduced, before one can learn from them. This is the weak point, in our method of teach-

ing history: that many think it sufficient if the scholars have filled their memories with a number of names, wars, battles, kings, or treaties, and are able to recite them fluently, even if, a few years afterwards, all should be lost again.

2. Instruction in history should progress from facts known to those which are unknown; from the simple to the complicated; from things that are easily understood to more difficult ones. A science which cannot be taught in an elementary way, does not belong in our common schools. History is so rich, and so much above the experience of children, that it requires a peculiar faculty of the teacher, to make himself perfectly understood. All children have some knowledge of places, time, and individual life, with its wants, wishes, trials, and other experiences. The beginning should, therefore, be made with the biographies of some celebrated men. The younger the scholars, the more should history be united to individuals and families.

Many teachers prefer to commence with ancient history. They like chronological order, the simplicity and distinctness in which the facts stand before us, the clearness with which we see the motives of historical characters, and the poetical hue that is so characteristic of that history. These are weighty reasons, and characters like Abraham, Joseph, or Moses, though widely separated from us in time, are better understood by beginners, than those of Washington, Frederick the Great, or Napoleon. On the other hand, History might, united with Geography, first ascertain how things are now, and then go back from the effect to the causes, from the present to the past. This way would interest even the parents, who would, certainly, in many cases, assist the teacher, provided the beginning be made with the native town, state, and country. In our common schools, history should be taught, more frequently, *orally*. The living word of the teacher, his looks and gestures, the tone of his voice, his explanations given just when needed, will make an impression on the scholars more lasting and clear than the best book can produce. There are a thousand things known by children who live in a city, of which adults in the country have not an idea. And on the

other hand, country life gives an experience which an inhabitant of a city never will get. No author can be found who could write a history for our common schools, which would be equally instructive, clear and interesting, in the different parts of our little State of Massachusetts.

Instruction in history may be made more interesting by the use of tables, engravings, or paintings; portraits, coins, or descriptions of celebrated places or historical events. A little collection of interesting and instructive curiosities may be made in almost every town, if the teacher understands how to instil a living interest for history into his scholars.

3. The teacher of history should regard the age and sex of his pupils. *Suum cuique.* Give the child what is due to him, but not more.

Explanations about leading ideas which for centuries have struggled for existence, and finally caused moral, social, or political revolutions, illustrations of the inner conditions of a nation's life, or the deeper connection of historical facts, are not understood by boys or girls thirteen or fourteen years of age. A gifted youth of twenty, may succeed in catching some rays of the historical sun, which will shed light over the misty surface of the past; only a full-grown man can become a historian. But even a child can and will learn, that it is God who governs the destinies and plans of men.

Due regard should be given to the sexes, on account of the essential differences of talents and the time of their development. Boys are especially interested in events which are earnest and great, and which have a powerful influence; girls are more attracted by that which is beautiful, tender, mild, and domestic, and both honor peculiar greatness of distinguished individuals of the other sex. The boy may learn to climb, by the example of great men; he may hear about rulers, heroes, and their deeds; may learn the distinction between a man's position, vocation, and labors; may see the bright side and the shadows of great men; and his bosom may swell by the thought of liberty, truth, native country, honor, virtue. The girl may hear of noble examples of true womanhood; may learn to understand her position, destination, and influ-

ence in life; may be led to see how much of everybody's character and position is due to a mother's influence during the years of childhood, and how such an influence extends from one generation to another. Facts may be stated to show how great woman's influence has been over the character of man; how she has been and is the main pillar of refinement, piety, and good morals in her narrow sphere at home, and how, in times of national calamity or danger, great men will arise, whose noble deeds are but the fruits of a good education which a true mother gave them. Historical examples of female character, in its virtue and fault, its strength and weakness, may be presented.

4. The teacher of history should take his standing-point in the country and time in which he lives, yet, in doubtful cases, be always true to himself and his eternal destiny. It is well known that a visible object often seems to change its form, if looked at from different positions. A professor of history in Italy will never publicly speak, in terms of praise, of the reformers or the Reformation, and no official teacher of history in Russia or Austria will dare to approve of the cause or the spirit of the American Revolution, or rejoice at its success. A German translation of our "Declaration of Independence" could not be printed in Prussia in the year 1847, and a teacher in Silesia was dismissed in 1849, because he read this document to the scholars of his first class in history. The American teacher is particularly favored. He may, nay, he ought to, take his standing-point upon the principles of political, religious, and social liberty, and judge from this with wisdom and justice of historical facts. What a noble position, what a rich material before him, and what an excellent opportunity to elevate the feelings and thoughts of the scholars!

5. The time and attention given to history should be in harmony with the other branches of instruction. However important history is in the public school, it is secondary to reading, writing, arithmetic, and singing. It is closely connected with geography, natural philosophy, and natural history, and may be taught to great advantage in connection or alternately with these studies. It would be well if a plan could be laid

out for every school, which would secure to each scholar who passes through all its classes, a certain amount of instruction in all the necessary branches. But, alas! the time to wish for so much has not yet come. Such a plan should be the guide of a school for, at least, five or six years. Our school committees are chosen but for one year, they govern the school and select a teacher for the same term, or even a shorter time, who brings with him propositions, plans, and "hobbies" of his own, and thus the very organization of a school changes more frequently than is beneficial.

What may be asked of a teacher of history? A teacher in our common schools is not a professor, and not too much should be expected. But there are some points which are absolutely necessary to teach this branch effectually. Not science itself, but the personality of the teacher and his method of teaching draws the children to school, and interests them for progress. More impressive than his words speak his personal appearance, manners, and deeds. Children like to imitate and to refer to the example of others in justifying their own acts. A teacher, therefore, should not only know much and be able to do much, but he should *be* much and possess much within himself, in order to influence his scholars in the best manner. If he intends to teach history, he should be a pious man, who sees the finger of God in all events around him. He should be morally an independent man, with a firm character; not a youth who is himself still a pupil, and has not yet taken a firm stand after a free examination and some experience; neither a passionate or feeble man, who is too easily influenced by the fluctuations of popular opinion or accidents of life. He should be a true and impartial man. It is a sin against truth and humanity to represent historical characters in a wrong light. Let him acknowledge cheerfully, freely and warmly, wherever some good is found, but also speak with a wise mildness and forbearance of errors, evils, and sins, whether found abroad or at home. The opinion of such a teacher will impress itself deeply in the hearts of his pupils — perhaps for a life-time. The teacher should thoroughly know himself and what he intends to teach, and

should have imbibed, in some degree, the spirit of history by self-examination and the study of eminent historical works.

The question is often asked, "What shall I teach in history, and whose work shall I select as a text-book?" The schools of our little State, even those of the same grade, differ so widely from each other, so far as regards the hours of public instruction, the number of teachers, scholars, classes, and rooms of a school, the number of branches to be taught, and the general plan of lessons, the ability of teachers and school committee-men, and the good or bad feeling among them, which insures more or less mutual coöperation; that it is as impossible to prescribe a recipe which would suit all or the majority of teachers, as it would be to propose one bill of fare equally healthy and palatable to all who should happen to dine on a certain day at a large eating-establishment. Each teacher must accommodate himself to circumstances, and in the beginning of the year lay out the best plan he can. History should be taught in different classes. The instruction should be entirely oral in the lower classes, and more so than it is now with the most advanced pupils. It might commence in the Primary Class and be regarded there as a reward or refreshment; it would then prove a stimulus in the Grammar, and a highly profitable study in the High School. Such a result, however, can be enjoyed only by a teacher who enters the school-room well prepared for the task of each day. However powerful outward influences may be, the good seed of a careful preparation will always have an important bearing upon the harvest. Such a preparation insures final success in teaching as well as in selecting books. Writing books is at present not an art, but a business; the moving spring does not always lie in the interest for science, but often in "material considerations," and, strange to say, many who never had any experience in, or much knowledge about, teaching, think themselves competent to write school-books: as if there were no difference between a good scholar and a good teacher; between understanding a science well himself and teaching it to others; between accumulating and communicating.

Among the various *methods of teaching history* three have thus far met with success.

First. The *chronologic* method, which commences with ancient history and closes with the present. It was formerly the only way in which history was taught in the higher schools of learning; it is the way in which the best historical works are written, and to which, in the end, every student of history will turn. This method found its way from the Universities into our public schools, and most, if not all, of our histories, written expressly for use in the latter, follow the same beaten track.

Second. The *regressive* method commences with the place where the scholar lives, and the latest events that have happened there. These facts are considered and brought into connection with other events, which acted as their causes. Thus it becomes local history, connected closely with the houses, places, or families, and, therefore, will be geography of the place. Then the circle is widened, and geography and history of the State becomes the field of investigation. Finally, the whole country, important cities, our national government, its branches, institutions and laws yield the material. This leads naturally back to the revolutionary war and its causes, the settlement of America and its discovery; Europe, especially England, France, and Germany, etc., etc. The churches in the place form the starting-point for history of the church to the time of Christ, the Jews, and the Patriarchs. Factories and mechanics open the field for history of inventions and a connection with natural philosophy. This is the way in which every self-taught man learns history, and which is exceedingly interesting to beginners. The present influences us, is known by us, and awakens therefore a great deal of interest; the past is only of importance because it was the foundation and the cause of to day.

Every one up to the years of manhood has to undergo a certain process of development and exercise. However much the ways may have differed, on which individuals arrived at their present state of culture, psychology would show that the unfolding and growth of our minds and souls depend just as

much on fixed, eternal laws of nature as the growth and health of our bodies. He, therefore, will succeed best and enjoy most, whose education is in the closest conformity with those laws; and that method of instruction will be the best which introduces a science to the scholar in a way similar to that in which that science was originally conceived by the inventors and made known to their cotemporaries. Geography, natural history, natural philosophy, and history form one great family and belong together. They tell us where man lived, what he did with things around him, and how he succeeded. Every one has his own experience and learns, at the same time, a great deal of what happens to others. Thus history was in the earliest times only the treasure accumulated in the memories of some gifted men, and thus was handed down from one to another, till the art of writing was invented. From that time the material accumulated, became more and more instructive, till, during the last century, history has become a living and life-giving organization.

This seems to indicate the best method for instruction in history. The parental house and its vicinity, the members of the family and their nearest friends should be the starting point, and history should naturally flow out as a branch from those exercises in observing and talking, which were mentioned in the last number of this journal, pp. 106, 107. Scholars who have gone through such a training in the Primary, Intermediate, and Grammar Class, will enter the High School with hearts and eyes wide open, and be well prepared to take a printed history, to understand the chronologic method, and to study and search for themselves. This method has been tried by thousands of teachers in Germany, for the last thirty years, with the best results. It may be applied in any class which consists of scholars who just begin this study. When introduced into a school with several classes, a heartfelt coöperation of all the teachers would be required.

Third. The *grouping* method is of a still more recent origin. Its peculiarity consists in collecting historical facts around some centres. Such a centre may be time. A calendar prepared for the class would point out events that hap-

pened on certain days of the year. Each day would thus become the anniversary of an invention, a reformation, or revolution, a battle, the birth or dying day of a great man; and thus make a deeper impression upon the mind, and especially the memory, of the scholars. Inventions, wars, forms of government, national documents, biographies, etc., may also be used as such centres, and yield a rich material. Such instruction may appear planless, and yet be highly interesting. Another way is to draw circles for different classes of a school, and begin in the lowest class with parts taken from the *domestic* life (Romulus, Cyrus, Alexander, Cato.) The next circle would be *social* life, with practical explanations of freedom, piety, wisdom, disinterestedness, (Solon, Lycurgus, Franklin, Lavater, Socrates.) The third circle would contain *political* life; awaken patriotism (Spartans,) and point out wise laws, (Dejoces, Solon,) show the relation of governing and governed, (Titus, Charles the Great, Peter the Great, Frederick I., Nero, Philip I., Elizabeth, Maria Stuart, Maria Theresa, Alexander the Great, Napoleon, Gustavus Adolphus,) and teach the value of republican institutions (Leonidas, Hofer, Brutus.) The history of nations belongs also under this head; their origin, customs, laws, enemies, and downfall (Rome, Carthage, French revolutions, Washington, Kosciusko, Cæsar.) The fourth circle would introduce to the scholar the *religious life* of the nations, and the fifth the history of arts, sciences, inventions, and discoveries. This would be followed and ended by a chronologic glance over the whole field of history. This method has been tried by gifted teachers in Switzerland and Germany with very good effect.

The writer would say in conclusion, that he is sorry to disappoint the hopes of a "fair correspondent," if the Resident Editor, in his remarks on p. 144 of the last number, referred to him. These lines pretend to contain only general remarks, to be applied, if correct, by every teacher in his own way. C. A.

HUGH MILLER.

The list of eminent dead, for the year eighteen hundred and fifty-six, is fearfully large, and embraces not a few of distinguished rank in the walks of literature, science, and general education. Of this number is Hugh Miller, the distinguished Scotch geologist, the sad intelligence of whose melancholy and seemingly premature death reached us just upon the opening of the present year. Mr. Miller was a remarkable man, and has left behind him a work and an example worthy of a lifetime. His labors have identified his name with the science of Geology and with religious journalism; and the story of his education and the peculiar characteristics of his scientific works render him a subject of peculiar interest to the teacher and practical educator.

An orphan boy at an early age, and in humble circumstances, he enjoyed but meagre opportunities for acquiring an education; yet his natural endowments seem to have been of that type that seldom fail to show themselves to advantage, in whatever sphere they may be developed. Born and nurtured amid the wild and rugged scenery of North Scotland, and in contact with her strong minds, he early possessed considerable physical vigor, and a mind of more than ordinary strength, though of slow development, and soon distinguished himself as an active, observing boy, humanely disposed, and possessed of a remarkable curiosity, which exhibited itself particularly in his fondness for the exploration and study of the works of nature. It is said that while a youth he was somewhat wayward; indeed, he himself speaks of his "truant carelessness in youth," but we suspect that waywardness, in his case, as in the case of many other boys, means merely that he possessed an active mind, with strong but honest impulses, without proper restraint and influences around him to guide those glowing impulses within the limits of a heathy development. There was nothing of the perverse or malicious in the boy Hugh Miller. He had a great fondness for reading, which early led him into the rich treasures of the poetry and legend-

ary history of Scotland, an element in his culture that has left its happy impress on all the records of his mind. His sympathy with the Scotch, and with their history and literature, was inborn and inbred, and it is very natural that such a youthful mind should find, as he himself has told us, the most ecstatic delight in perusing the works of "Robie Burns," and the "Actes and Deidis of ye illuster and vail-yeand campioun shyr Wilham Wallace."

A laboring man himself, he was emphatically the laboring man's friend. His achievements and fame might well be cited to vindicate the dignity of labor, if such vindication were needed, as, most assuredly, it is not. To him labor was not drudgery, but the mission of life, cheerfully and manfully pursued. As we follow him through his career of half a century, we find him, after leaving school, serving as a stone-mason and quarrier's apprentice and journeyman, then a banker's clerk, and finally an editor, and *always* pursuing his geological studies and researches with a curiosity as fresh as that of an imprisoned school-girl, just let out into the fields in search of flowers. He lived near to Nature, in communion with her varied works, and in a state of healthy exhilaration — a calm yet glowing enthusiasm.

Mr. Miller's published works are valuable contributions to the cause of science and education. As editor of a religious paper, the organ of the evangelical portion of the Free Scotch church, he ranks among journalists of the first class.

His Autobiography, entitled *My School and Schoolmasters*, is valuable and interesting, giving us a panoramic view of his education and the subsequent development of his character. To the practical teacher no subject is of greater interest than the growth and culture of the human mind, viewed in connection with surrounding circumstances; and this interest is greatly heightened when the picture of such a growing mind is sketched with simplicity and freshness, by that mind itself, as is the case in Mr. Miller's Autobiography. His *First Impressions of England and its People*, is an entertaining and racy book of travels, and gives the reader a good insight into the English character and institutions.

But a short time previous to his decease, he published some pretty severe strictures upon that portion of Mr. Macaulay's late volumes relating to Scotland. In this little work, Mr. Miller shows that he possessed no mean powers as an Essayist, and that he had been a thorough and careful student of history; but we doubt if that pamphlet will, on the whole, add much to his reputation, or affect, to any extent, the soundness of the positions taken by the brilliant historian.

The crowning works of Mr. Miller's life — those which we should select as exhibiting his noblest and most successful labors in behalf of science and of the recognition of God in Nature, are *The Old Red Sandstone*, and the *Footprints of the Creator*. The last-named work is a most triumphant refutation of the Development Theory, as it is called in Physical Science — a theory which, a few years since, overriding all rational principles of scientific deduction, put forth the most presumptuous claims to a final solution of the great mystery of creation. This theory completely captivated the fancy of irreverent smatterers and superficial dabblers in science, and was pompously heralded as the harbinger of a new interpretation of the Book of Nature. Mr. Miller's clear and comprehensive mind easily detected the shallowness and inconsistencies of this absurd theory, and was ready to expose its fallacies. We believe there is but one opinion among candid, scientific men of eminence, in regard to the treatment of this theory in the *Footprints of the Creator*, and that is, that the stone-mason and geologist of Cromarty has shown, to the satisfaction of every Christian scholar, that it is entirely destitute of any rational claims to support or consideration. As a popular and yet learned scientific treatise, the *Footprints of the Creator* is almost unrivalled, and has elicited the highest commendations from the first scientific men and scholars of the age.

We commend the published works, the life, and the example of Hugh Miller to every teacher, scholar, and young man. He has done much towards maintaining the principle of a recognition of "God in the Universe," and has probably contributed more than any other man during the present century to popularize and advance that very attractive science — Geology.

His life is a "Finger-Point" to a successful and honorable career, and to the realization of that sentiment once uttered by himself, — "*that life itself is a school, and Nature a fresh study.*"

A. P. S.

PARENTAL DISCIPLINE.

MR. EDITOR:—For many years I have observed with much interest, the modes in which parents govern their children; and I have thought that some general hints, based upon my observations, might be serviceable to fathers and mothers. I present, for their consideration, the following suggestive generalizations:

If a child be cross and peevish, scold him,—on the homœopathic principle, that "like cures like."

If he be boisterous, reprimand him in such a manner as to make more noise than he does; by observing how others speak, he will thus be able to modify his own manner.

If he be disposed to cry at trifles, whip him; it will bring the disorder to a crisis.

If he be dull of intellect, tell him he is a "fool," a "scamp" a "blockhead," or a "ninny;"—praise is a great encouragement.

If he lack self-respect, announce to him, emphatically, that he is a "good-for-nothing fellow," or a "little rascal," or "scoundrel;" it will help him to place a just estimate on his own character.

If he be indolent, permit him to rove about at pleasure; it will give him a knowledge of the world; and assign him no disagreeable task, lest he become incorrigibly disgusted with all labor.

If he indulge in coarse language, accustom him to the use of elegant expressions, by politely requesting him to "shut up his head," or "stop his noise," or "clear out," *et cetera ad infinitum;* the experience of numberless parents testifies to the efficacy of this method.

If he be naturally timid, confine him in a dark closet, or threaten to put him down cellar, or discourse to him about the "old man," or "bears," or "ghosts;" the remedy will produce its effect.

If he be disobedient, be sure to compel him to obey *occasionally*, inasmuch as he has the privilege of doing generally as he pleases.

If he manifest a selfish spirit, forbid his giving away any of his "things" to his playmates; and when an extra eatable has been bestowed on him, direct him not to let his brothers and sisters see it; this will lead him to compare his own with others' interests.

If he be prone to pilfering, suffer him to explore every box and jar, in closet and pantry, to appropriate to his use every thing that falls in his way, without being questioned as to where it was obtained: satiety may remove excessive desire.

If he be untruthful, assure him that the very next time he tells a falsehood, you will certainly "cut off his ears," or "take every particle of his skin off;" or promise him, conditionally, a cake or a cuffing, sugar or a shaking, a whip or a whipping; and then forget or disregard your promise: example has a potent influence.

If, in fine, he exhibit, as years increase, a want of high aspirations in life, and but a feeble consciousness of his duties to God and man, affectionately and impressively inform him that you *expect* he will "come to the house of correction," or "the State prison," or "the gallows," and you will have done all you can to —— RUIN HIM. H.

FLOGGING CHILDREN. — The infliction of corporal punishment *may* be a necessity: we think it is not. Indeed, we should have no faith in the capabilities of a preceptor who thought it needful to apply to human beings a discipline which cannot be too sparingly administered even to dogs. Flogging is the resource of three sorts of masters — an idle one, an ignorant one, and — a brute. — *London Literary Journal.*

Resident Editor's Department.

HIGH SCHOOLS IN MASSACHUSETTS.

At the recent dedication of a Free Academy, in Norwich, Conn., an address was delivered by Rev. John P. Gulliver, of that town, in which the comparative advantages of public schools and endowed institutions were discussed at considerable length. Some of his views, we feel sure, will be quite novel to the readers of this journal. Intimations are given that the system of public instruction, in its higher departments, is already on the wane, and that serious apprehensions are beginning to be felt among the most intelligent friends of education, as to the ultimate success of the public High Schools, which, for the last twenty years, have been the pride and glory of Massachusetts. The arguments with which he sustains his position, although perhaps new to him, are precisely such as were used by a certain class of educationists in this State, when the subject of public High Schools was first brought to notice, and have since been found to be of no practical weight whatever. They may be enumerated briefly as follows: the burden of taxation; changes consequent upon popular caprice; and the want of appreciation among the common people of the advantages afforded by high intellectual culture. These points would not, perhaps, be worthy of consideration, were it not for the fact that the same gentleman, on other occasions, has made similar statements, and brought the schools of Massachusetts into unfavorable comparison with his own favorite system of education. We will not deny that his opinions have had some weight, for we find them copied into one of our leading religious newspapers, and his assumptions partially endorsed by the editor. Nor will we deny that an endowed institution possesses some advantages over that supported by taxation; but we have yet to learn of the first case where the former, existing side by side with the latter, yields to it in point of thoroughness, excellence, or stability On the other hand many instances can be found where liberally endowed institutions have been swallowed up by those maintained by the community at large. He would not have been obliged to travel far for an example; for, if we remember rightly, the Principal of Norwich Academy was formerly master of a school which received under its protection the declining fortunes of a liberal endowment. The only motive to which we can attribute his rhetorical exaggerations, next to the occasion which called forth his discourse, is the desire to push his own particular theory into the favor of the public, which he affects so much to despise, and on whose judgment and good sense he is so unwilling to rely. We propose to examine briefly the three state-

ments above alluded to, and to place by their side the results of twenty years' experience in this State as to the working of our system of education; for such results afford the only true means of judging of its practical benefits. Individual towns cannot, of course, be taken as our standard of judgment. The system is a general one, and we must refer to facts derived from aggregate results.

1. *Taxation is so burdensome that the complaints of the people often interfere with the success of the school.* Massachusetts has always acted on the principle that the greater the intelligence of the masses, the greater is the amount of property taxable, and the less the need of prisons and almshouses. Knowledge is considered not only as the safeguard of liberty, but also as a means of increasing wealth. Upon this principle the appropriations for educational purposes have steadily advanced in proportion to the amount of accumulated capital and the productive power of the people.* Thus it will be seen that those who favor the undue restriction of taxes for schools, have always been in the minority. We are well aware that there are seeming exceptions to this principle, but they will be found to be incident to particular localities, and therefore not properly belonging to the subject under consideration.

In comparing this method of supporting schools with that proposed by Mr. Gulliver, we find that it has one great advantage not realized in his peculiar system. It is this. If schools are supported by taxation, *the interest felt in them is more general.* A man who pays a tax of one dollar, feels that he has done something for intellectual advancement, and his attention is thereby called to educational subjects, when otherwise it might have lain dormant, and his own children perhaps have remained uneducated. Moreover that is a very narrow view which would confine the oversight of our schools to a self-perpetuating body of twelve men. It savors too much of Jesuitism. All classes of men have, or ought to have, an equal interest in such subjects, and it is in opposition to the spirit of our institutions to favor any plan whereby general interest shall be withdrawn from what promotes the general good.

2. *Changes consequent upon popular caprice.* These, we confess, are somewhat frequent, more so than is for the good of education generally, but not so many as Mr. Gulliver would have us believe. In most cases, however, they are the results of some bad working of the school in which

* In 1837 the cities and towns of the State raised by taxation for teachers' wages, board, and incidental expenses, the sum of $387,124 17, while in 1855 the sum of $1,213,953 55 was appropriated for the same purposes. There has been in this item of expenditure an annual increase, amounting, in the aggregate, to the vast sum of $826,829 38. In 1837 the appropriation for each child between the ages of five and fifteen years, was $2 62, and in 1855 it was $5 48, or an increase of one hundred and nine per cent. In 1840 the appropriation was $3 19, in 1845 it was $3 60, in 1850, $4 71, and in 1855 it amounted to $5 48 for each child in the commonwealth, between the ages of five and fifteen years. In 1837 the property of the State was equal to $393 for each inhabitant, in 1840 to $406, in 1850 to $600, and in 1855 it was not less than $790, or an increase of one hundred per cent. in twenty years. It is thus seen that the increase of appropriations in this branch of expenditure has exceeded the increase of capital in the State by nine per cent. The facts already stated also show that the productive power of each individual has increased one hundred and eleven per cent. since 1837; and from the entire view presented we are able to deduce the yet more remarkable truth, that the appropriations for the education of each child, the accumulation of capital, and the annual, individual, productive power of our people have been promoted in corresponding ratios.—*Twentieth Annual Report of the Secretary of the Board of Education.*

they occur. They are of individual and not of general experience. If the teacher is incapable of performing the duties of his situation, there ought to be a change, and this happens no more frequently in public than in endowed schools. If the course of study fails to meet the wants of an enlightened community, there ought to be a change; and this is more likely to take place when the voice of the people is heard through the ballot-box, than when the control is with a few individuals holding set opinions, and oftentimes sectarian views. We believe that facts will show that there have been greater changes in endowed academies, in proportion to their number, than in public High Schools.

3. *The want of appreciation among the common people of the advantages afforded by high intellectual culture.* It is very true that they cannot always appreciate the *studies* pursued in High Schools, nor see their immediate or remote usefulness. But in both systems there is the same difficulty. The "great masses" are obliged to rely upon the wisdom and judgment of those who are appointed as guardians of education, who, in both cases also, are equally liable to the charge of incompetency or perversion of the public trust. We will not admit, however, that the people of Massachusetts are unable to see the *advantages* of such institutions, or are unwilling to carry them to the highest degree of perfection. As far as our own experience goes, the greatest opposition to a liberal provision for High Schools has come from quite a different source from that to which Mr. Gulliver attributes the cause of "serious apprehension" as to their success. We remember that a gentleman of his own profession once argued quite earnestly against a project which we had formed for obtaining a library for the free use of a High School, on the ground that it would not be appreciated nor read by the pupils, while at the same time liberal-minded men, without a so-called liberal education, opened wide their purses for an object which is almost indispensable in such an institution.

It may be said in reply to the statements above made, that they are applicable only to schools of a lower grade than is contemplated by the founders of the Norwich Free Academy. But the High Schools of Massachusetts have maintained generally a higher rank than Academies, and have been the means of raising the standard of education wherever they exist. The Secretary of the Board of Education states that they have not only furnished instruction to all who have chosen to accept it, but have furnished a better practical education than could have been obtained thirty years ago in any institution in Massachusetts. As an index of the prosperity and success of higher public schools in this State, we commend to Mr. Gulliver's careful attention the statistics contained in the note* at the bottom of the

* NOTE.—Assuming that a population of three thousand will give five hundred families to a town, there are ninety towns in the State that are legally bound to support a High School. Of these fifty-six are known to have complied with the law; from fourteen no returns were received; and in the remaining twenty towns such schools have not yet been established. It is proper, however, to observe, that the census of 1855 is the basis of this statement, and that the necessary steps will soon be taken in many towns for the establishment of High Schools. But there are already, according to the returns received, eighty High Schools, twenty-four being in towns having a population each of less than three thousand inhabitants. In seventy of these schools the Greek and Latin languages are taught, and the salaries paid to the eighty masters average nine

page, by which he will find that far from feeling any "serious apprehension" as to the success of our present plan, the people of Massachusetts are still devising new measures for the further advancement of this glorious system of free instruction.

We cannot, therefore, agree with the objections of Mr. Gulliver, because they are neither founded in fact, nor are they likely to occur in the present working of our schools, except, as we have before stated, in solitary instances for which parallels can readily be found in that other class of institutions to which, either from choice or compulsion, he has become excessively attached. That our system has its defects, we will not deny; but these, we think, will be removed by time and experience. One of the most serious evils connected with it is the short tenure of office allowed to school committees. This subject, however, has already engaged the attention of proper authorities, and we trust will be so disposed of as to remove any cause of "serious apprehension" arising from sudden changes and popular caprice. G.

The Boomerang. — We do not know that any of our readers in this latitude have ever met with the missile bearing this barbarous name. A few years ago it was utterly unknown. The first that was heard of it, possibly reached New Bedford or some similar whaler's elysium, — then a ship bearing the unmusical cognomen painted on her stern floated into a seaport of England, from far-away Australia, — next it found its way into the appendix of Noah Webster's dictionary, and now, at last, it becomes the subject of familiar newspaper comment. The following paragraph, which has for some time wandered through the papers of the day, does but faint justice to its claims; for the boomerang defies the calculations of science as effectually as did the construction of the bees' cell for centuries, until Brougham and the rest of the moderns demonstrated that the tiny insect was a better mathematician than Euclid. The mystery of the *Boomerang angle* is an open question, but he will be a bold man who attempts to solve it by practical experiment. Who throws the boomerang had best "beware of the rebound!" Many have essayed to hurl it from them, and found it rattling at their pates an instant after. The Australian savage alone has a sure thing of it. It returns to his hand from its deadly aim as naturally as the lamb to its mother's milk. He will throw it over a house, and, presto, he is ready to hurl it back again. Thrown as he throws it, it is an ever-recurring weapon, and the feat to a stranger looks like a piece of diabolism.

"This curious weapon, peculiar to the natives of Australia, has often proved a puzzler to men of science. It is a piece of carved wood nearly in the form of a crescent, from thirty to forty inches long, pointed at both ends, and

hundred and seventy-eight dollars, the lowest average in any county being six hundred dollars, and the highest two thousand one hundred and seventy-five dollars. Forty-two of these schools have been established since the commencement of the present decennial period, and not more than ten are known to have been in existence in 1837. Of the whole number fifteen are in towns having less than twenty-five hundred inhabitants each, and in these instances there is no legal obligation to support a High School. There are in all one hundred and twenty-one towns, having each a population exceeding two thousand and five hundred, and most of them, no doubt, contain five hundred families, and a large addition to the number of High Schools may therefore be expected in the next five years.— *Twentieth Annual Report of the Sec. of the Board of Education*, page 85.

the corner quite sharp. The mode of using it is as singular as the weapon. Ask a black to throw it so as to let it fall at his feet, and away it goes full forty yards before him, skimming along the surface at three or four feet from the ground, when it will suddenly rise in the air 40 or 60 feet, describing a curve, and finally drop at the feet of the thrower. During its course it revolves with great rapidity on a pivot, with a whizzing noise. It is wonderful so barbarous a people have invented so singular a weapon which sets laws of progression at defiance. It is very dangerous for a European to try to project it at any object, as it may return and strike himself. In a native's hand it is a formidable weapon, striking without the projector being seen, like the Irishman's gun shooting around the corner, as well as straight forward. It was invented to strike the kangaroo, which is killed by it with certainty, and though a copse intervene between the hunter and the animal, the boomerang comes around the corner and breaks his legs."—*Baltimore American.*

[We once owned one of these strange missiles, and can testify to the truth of much of the above description, though we never dared use it very freely for fear of cracking our own skull. Is not the theory of its action connected with that of the Gyroscope described in a recent number? — A.]

THE FATHER'S DUTY. — We estimate a mother's importance in her family as highly as any one can; and yet we do not believe that she monopolizes all the qualities needed for the great work of training up human beings. Her very familiarity with her children places her, in some respects, at a disadvantage for the exercise of wholesome authority. The wise father will not indeed take the reins of family government from his wife; but he will make his children feel that her gentle sway is confirmed by a firm and steady hand; that behind a mother's tender heart stands a cool judgment, and a will stronger even than their own, and that they cannot impose upon the one nor resist the other. But if he would be truly the father of his family, he must not be a stranger to them. It will answer no purpose for him to come in once in a while to meet some great emergency, and awe down rebellion by hard authority. He must be a companion, the friend of his children. Strong natural love must be the basis of all beneficial discipline.

But this is also, I had almost said, equally necessary for the father himself. Nothing keeps the heart so fresh and young, saves it from bitterness and corrosion, through the cares, conflicts, and disappointments of life, as the daily enjoyments of a happy home. And a man of business or a scholar, who thus allows himself time for relaxation, and for the play of the domestic affections, will in the course of years have accomplished more, with less wear of mind and body, than one who has been all the time on the stretch, seeking "to catch the nearest way" to wealth, or any other object of personal or public good. — *Selected.*

STYLE. — A Welsh triad would comprise all the rules for style. Say what you have to say as *perspicuously* as possible, as *briefly* as possible, and as *rememberably* as possible, and take no other thought about it.—*Southey's Letters.*

A man fully possessed of his subject, and confident of his cause, may almost always write with vigor and effect, if he can get over the temptation of writing finely, and really confine himself to the strong and clear exposition of

the matter he has to bring forward. Half of the affectation and offensive pretension we meet with in authors arises from a want of matter — and the other half from a paltry ambition of being eloquent and ingenious out of place.— *Lord Jeffrey.*

MATHEMATICAL QUESTIONS.

	m.	fur.	rd.	yd.	ft.	in.
QUESTION 12th.—From	1	0	0	0	0	0
Take		7	39	5	1	5

The difference to be found by means of rules for Compound Subtraction, and proved accordingly. J. Q. A., Greensburg, Ind.

QUESTION 13th.—Solve by quadratics $x^2 + xy = 8$, and $x^2 + y = 6$.

T. S.

ANSWER TO QUESTION 1.—We give the following as the simplest mode presented for finding the values of the unknown quantities, although we doubt the propriety of calling it a *solution*.

(1) $x^2 + y^2 = 8$,

(2) $x + xy = 6$. Multiply (1) by $x^2 - y^2$,

$x^4 - y^4 = 8x^2 - 8y^2$; by transposition,

$x^4 - 8x^2 = y^4 - 8y^2$; adding 16 to each member,

$x^4 - 8x^2 + 16 = y^4 - 8y^2 + 16$; taking the 2d root of each member,

$x^2 - 4 = y^2 - 4 \therefore x = y$. Equation (1) then becomes

$2x^2 = 2y^2 = 8 \therefore x = y = 2$, values which satisfy (2).

C. W. R., English High School.

Wrought out in nearly the same manner by M. P. P.

The process given above seems at first view to be correct, inasmuch as the values given by the 1st equation satisfy the 2d. But this can happen only when the values of x and y are equal, and the solution must proceed upon that presumption. Their equality, therefore, might just as well have been assumed at first.

The equations may also be solved by making $x = y + d$, and eliminating y from the resulting equations. An equation of the 4th degree in d will thus be obtained, one root of which will evidently be zero, thus showing that x and y are equal, assuming zero as the appropriate value of d.

But this mode involves an equation above the 2d degree. Indeed, it is believed that no *general* solution by quadratics can be found for equations of this form. Other supposed solutions of this problem have been presented, but all of them have either contained a mistake or a fallacy, or have required the solution of equations higher than the 2d degree, which last is contrary to the conditions prescribed.

Other approximate values found by Newton's method are $x = 2.4$, $y = 1.5$, or more exactly, $x = 2.393955$, $y = 1.506312$; the other two values for each being imaginary.

ANSWER TO QUESTION 6th.—Take a point on the upper edge of the rectangle 4 feet, and a point on the lower edge 5 feet, from the left-hand end;

through the vertex of the lower left-hand angle and the specified point on the upper edge, draw an indefinite straight line; also, through this same point on the upper edge and the middle point of the lower edge, draw an indefinite straight line; from the vertex of the lower right-hand angle, draw two lines respectively perpendicular to these indefinite lines, and a square will be formed equivalent to the rectangle, the latter being cut into four parts. The manner in which the lines cross the rectangle shows how to cut the board. Each side of the square is of course equal to $\sqrt{20}$.

ED., from a drawing by the proposer.

This problem admits of an easy demonstration, if we vary a little the data in the construction of the figure. ED.

ANSWER TO QUESTION 7th.—At points 6 feet from each end, and on opposite edges of the board, make two transverse sections 4 feet in length, that is, to the middle of the board; then make a longitudinal section from one of these middle points to the other. By placing the two pieces thus formed together in a proper manner, we shall form a square, each side of which is 12 feet. By B. F. S. G. and E. F. JR.

ANSWERS TO QUESTION 8th.—Two apples multiplied by 2 gives a product of 4 *apples*. But two apples divided by ½ is impossible, since an abstract number cannot be contained in a concrete. Half an apple is contained in 2 apples 4 *times*. N. A. P.

Two apples multiplied by 2 would make the number 4 apples. But if the question were in this form: Gave to some boys 2 apples, giving to each boy ½ an apple; how many boys were there? We should have 4 *boys* for the result; and the answer would be, the difference between 4 apples and 4 boys. But as the apples would be readily *assimilated*, the question "becomes one of time only," as our reformers say. B. F. S. G.

DEFINITION OF AN ANGLE.

No part of a scientific work requires more care, accuracy, and precision, than definitions. This is especially the case in elementary treatises on the exact sciences designed as text-books for beginners. If the definitions are loose, or do not express the exact quality or relation wanted, the ideas of the student will be vague and uncertain; if they contain what is superfluous, they anticipate something which is, or should be, the object of subsequent demonstration.

These remarks are suggested by a *rather recent* definition of an angle, which some writers have thought proper to introduce, and which is found in several elementary text-books on Geometry. "An *angle* is the indefinite space comprehended between two straight lines which cut each other, and which may be conceived to be produced as far as we please."—"*Cours de Mathématiques*:" By Allaize and others.

"When two straight lines, AB, AC, proceed from the same point A, and are extended indefinitely in the directions from A to B and from A to C, the space which is comprehended between these lines, and which is unlimited in the direction opposite to their point of meeting, is called an *angle*."—*Didiez*.

"A plane ANGLE is the portion of a plane included between two straight lines meeting at a common point."—*Davies's Legendre*, 1854.

"When two straight lines, AB, AC, meet each other, the space included between the lines is called an *angle*."—*Perkins's Elements of Geometry.**

How can two straight lines include space or a portion of a plane, if we use the word *include* in its proper sense? Euclid says they cannot. "Two straight lines do not contain a space." *Ax.* 10th. Again, the space said to be included between the lines is, according to each of these definitions, either expressly or tacitly considered as indefinite. Hence, in comparing the magnitudes of two angles, we are comparing indefinite quantities; how, then, shall we have a definite ratio?

Another evil resulting from the definition to which we object, is that the young learner is very apt to think that the magnitude of the angle depends on the length of the sides. He will very naturally say,—Surely, two long lines include a greater space than two short ones. Every experienced teacher knows the necessity of guarding the pupil against this error, whatever be the definition of an angle. Why, then, should we increase the liability to error by the definition itself? In fact, three of the authors referred to, seem to have been conscious of the imperfection in their definition, for their subsequent reasoning ignores the idea that space has any thing to do with the magnitude of an angle; and besides, one of them, Perkins, gives another definition, but assigns to it a subordinate rank. Didiez alone is consistent, for he actually uses the idea of indefinite space in his reasoning upon angles.

Euclid's definition is: "A plane angle is the inclination of two lines to one another, which meet together, and which are situated in the same plane;" and Professor Peirce says: "the *magnitude* of the angle depends solely upon the *difference of direction* of its sides at the vertex." In these definitions, the essence of an angle is, the *inclination* of two lines to each other, or *difference of direction;* and this is the very idea which an intelligent student must ultimately attach to an angle. T. S.

Notice.—It is desirable, when questions are communicated for this department, that they should always be accompanied with solutions.

INTELLIGENCE.

WORCESTER COUNTY TEACHERS' ASSOCIATION. — A large number of teachers of this county recently met at Worcester, to take measures for the formation of an association similar to those already existing in most of the counties in the State. The meeting was organized by choosing Mr. E. A. Hubbard, of Fitchburg, as chairman, and Mr. E. G. Hewett, of Worcester, as secretary. Mr. Hubbard, Mr. Bushnell, of Worcester, and other gentlemen, made earnest and encouraging remarks, setting forth the objects and advantages of such an association. The meeting adopted the following resolution:

Resolved, That we will form an association, in accordance with the provision of the statute of the Commonwealth, to be called "The Worcester County Teachers' Association."

It was decided that the Association should hold its first regular meeting in this city, on Friday and Saturday, the 12th and 13th of June next, commencing on

* In his large work on Geometry, Professor Perkins has abandoned this definition.

Friday morning, at 10 o'clock. It was thought best to organize the Association at that meeting, and follow the organization with lectures, discussions, and other exercises, calculated to interest and profit teachers and other friends of education. Due notice of the meeting and its projected exercises will be given in the county papers, and by circulars.

Messrs. Hubbard, of Fitchburg, Hewett, of Worcester, and Pierce, of Uxbridge, were chosen to draft a constitution and by-laws. Messrs. Sprague, Greene, and Hewett, of Worcester, were chosen to secure lecturers, select topics for discussion, and give notice of the meeting in June. Messrs. Bushnell, Hunt, and Beane, were chosen to make the local arrangements; Messrs. Aldrich, of Millville, Woodbury, of Fitchburg, and Roberts, of Millbury, were chosen to collect and present statistics. All seemed to regard the prospect as very favorable for an association in the old county of Worcester, such as almost all her sister counties have already formed — some of them many years since.

State Normal School. — At the semiannual examination of candidates for a new class at the State Normal School in Salem, on Tuesday, March 10th, thirty-seven young ladies were admitted, — a decided increase on the last entering class.

Increase of Salaries. — The masters of the Grammar Schools in Dorchester have recently had their salaries raised to $1000. The salaries of teachers of the same grade in Charlestown have been changed from $1200 to $1300 per annum.

Literary Record.

Messrs. Phillips, Sampson & Co. have recently issued a new work, entitled "Arctic Adventures, by Sea and Land, from the earliest date to the last expeditions in search of Sir John Franklin; with maps and illustrations: edited by Epes Sargent." This work, as its title indicates, contains a general synopsis of all the explorations made in the north polar regions. It will prove a valuable reference book for teachers, as it comprises all the important scientific and geographical discoveries up to the present time. It makes a volume of 480 pages, handsomely printed and illustrated. The same firm has also published, conjointly with Childs & Peterson, Philadelphia, a new edition of Dr. Kane's First Arctic Explorations. It is printed in the magnificent style of the same author's more recent work, which has met with such immense sale and such merited succes.

Charles Desilver, Philadelphia, has published a new school-book of pieces for declamation, dialogues, debates, &c. It is entitled "The Intermediate Standard Speaker; by Epes Sargent," and is intended as introductory or supplementary to the larger compilation by the same author, which is so generally used in Acadamies and Colleges. The selections are mostly new and entirely different from those in Mr. Sargent's previous work. The debates and dialogues are excellently adapted for school exhibitions.

Messrs. A. S. Barnes & Co. have just published a school book, called "Morals for the Young, or Good Principles instilling Wisdom; illustrated with engravings and moral stories: by Emma Willard." This has been prepared partly as a reading book and partly as a text book for class-teaching in moral philosophy. The high character of the compiler, and her success as a teacher, afford sufficient recommendation for its worth.

Messrs. Gould & Lincoln have sent us the "Annual of Scientific Discovery, a Year-book of Facts in Science and Art; 1857": edited by David A. Wells, A. M. This contains a beautiful engraving of Jeffries Wyman, a History of the Progress of

Science for the year 1856, and an Account of all the Discoveries in Mechanics and the Useful Arts, Natural Philosophy, Chemistry, Geology, Zoology, Astronomy, and Geography, which were made during the past year. No teacher who wishes to keep up with the times can do without it.

Messrs. D. Appleton & Co. have printed a new edition of Xenophon's Anabasis, with explanatory notes: by James R. Boise, Professor of Greek in the University of Michigan. The text is from Hertlein's edition, and is printed in beautiful Oxford type. The appearance of the book is very attractive.

The Historical Magazine for March, published by C. Benjamin Richardson, Boston, besides the proceedings of various historical societies in the United States, contains the following interesting articles: "The Fall of the Susquehannocks," "Revolutionary Letters," "A Dutch Ode to Washington," "Jesuit Letters," "William Maxwell, LL. D.," and a valuable collection of notes and queries.

We are indebted to the Hon. Secretary of the Board of Education for a copy of his valuable Report for the year 1856. Every one interested in the subject of popular instruction should procure it and read it carefully. It gives a vast amount of information relative to our public schools of all grades, and offers suggestions which are worthy of being treasured up by every practical teacher. Abstracts of various town reports are also presented, together with the usual statistical and comparative tables.

Additional Recent Publications.

Familiar Science, *or the scientific explanation of the principles of Natural and Physical Science, illustrated with upwards of* 160 *engravings;* by David A. Wells, A. M.; Childs & Peterson, Philadelphia, 1857.

School Speaker, by Noble Butler, containing a good selection of pieces for declamation, &c. Morton, Griswold & Co., Louisville, Ky.

Reviewers' Table.

The Hundred Dialogues, *new and original, designed for Reading and Exhibition in Schools, Academies and Private Circles. By William Bentley Fowle, Author of Familiar Dialogues, &c., &c.*

Parlor Dramas, *or Dramatic Scenes for Home Amusement.* Boston: Morris Cotton.

The author of the books before us has conferred a great benefit upon schools and home circles, by furnishing them with many of the best dialogues ever written. We know of no other person who has in this way done so much for young people, as has Mr. Fowle. The titles of the above-named books tell their own story. The "*Parlor Dramas,*" while especially adapted to home use, may appropriately be performed in schools composed of both sexes. Among the "*Hundred Dialogues*" may be found pieces adapted to all grades of scholars, from the primary school to the high school. H.

School Melodies, *containing a Choice Collection of Popular Airs, with Original and Appropriate Words; composed expressly for the Use of Schools, by J. W. Greene.* Boston: Morris Cotton.

A careful examination of this work will convince any person that it is admirably adapted to the use of schools. The original words must prove especially attractive to children. The music comprises many excellent new pieces, as well as some favorite old tunes. H.

THE MIND AND HEART, *or School and Fireside Reading for Children, by William B. Fowle.* Boston: Morris Cotton.

This is a beautiful book of 160 pages, containing many very charming compositions, original and selected, for the entertainment and instruction of the young. It is richly worth buying. H.

EDITORIAL POSTSCRIPT.

APRIL, 1857.

A MODEL REPORT. — We find at the close of the Annual Report of the School Committee for the town of South Reading, the following sensible remarks, which we commend to the attention of all others in authority, with the hope that they will give similar counsel and advice to their constituents:

"With these few statements and suggestions, we, — so far as we can legally, — render up our trust to the town; supposing it to be unnecessary at this day to urge upon our citizens the duty of cherishing these institutions, to which,—with all their imperfections, — our old Commonwealth is more indebted for its true glory, than to any other agency. Should there be parents, however, who wish to inform themselves on matters of educational interest, and to have their minds "stirred up by way of remembrance," we advise them not to be satisfied with perusing the Annual Report of the School Committee, but to read the Report of the Board of Education, and subscribe for the "Massachusetts Teacher," thus making themselves familiar with the operation of our school system throughout the State and country."

WARMING APPARATUS. — Dr. Kane could have found no greater contrast, between the balmy airs of Cuba and the foul, dark atmosphere of the ice-lined, moss-covered cabin of the Advance, as she lay in winter harbor, within twelve degrees of the Pole, than is to be found between the warm, pure air of our best school-rooms to-day, and the foul vapor we were doomed to inhale in our boyhood.

We shudder as we think of the old school-house; and well we may, for we have three fevers and an enfeebled constitution charged to it. What has wrought this great change? What has enabled us to breathe a warm, pure, equable atmosphere, while living in the most variable climate on the face of the globe? Architecture has done something; ventilation has done something; but to our warming apparatus is the credit of this wonderful change chiefly due.

We cannot be too grateful to those, who, by an expenditure of time and money in experiments and the application of science to art, have enabled us to take a stream of pure cold air from the outside of our dwellings, warm it to a summer heat, and send it, as pure as God made it, to the seventy-five square yards of delicate membrane that line the human lungs.

Such men are public benefactors. They save doctor's bills, and sweeten the temper of the teacher and the taught. We have been led to these remarks, because we have often felt their truth during the severe winter just passed, — having taught in a room warmed by one of Chilson's new "Cone Furnaces."

Mr. Chilson claims to have developed a new principle, in this furnace, — a cut and explanation of which will be found on the last page of our cover. To all in want of a furnace we would say, examine this, thoroughly, before making a choice. As for ourselves, we are bound to speak well of the bridge that has carried us safely over the stream. P.